

# Tracking bull trout in Olympic National Park, Washington

By Samuel J. Brenkman and Stephen C. Corbett

THE MIGRATORY PATTERNS of bull trout (*Salvelinus confluentus*) are the focus of an ongoing three-year study in the Hoh River of Olympic National Park in Washington. The bull trout is a member of the salmon family, related to Pacific salmon, trout, and Dolly Varden. Though the bull trout has declined throughout most of its historical range and is federally listed as threatened, its status and biology in national parks within its range remain largely unknown. Research in the last decade reveals that declines in distribution and abundance are due to degradation of freshwater habitats, overfishing by recreational anglers, hydroelectric dams, irrigation projects, and displacement by nonnative fish species. Olympic National Park contains some of the last remaining undisturbed habitat throughout the entire range of bull trout. However, bull trout in the park have been negatively influenced by land-use activities adjacent to the park boundary coupled with mortality associated with recreational and tribal fisheries directed at Pacific salmon and steelhead.

One critical question related to the life history of bull trout is whether populations with access to the ocean exhibit diadromy, or migration between freshwater and marine environments. The potential for diadromy in bull trout exists in large, free-flowing river systems that originate in Olympic National Park. In the current study, radiotelemetry was used to determine migratory patterns of adult bull trout in the Hoh River Basin. The primary objectives were to determine seasonal movements of adult bull trout, location and timing of spawning, use of estuarine and marine waters, and extent of use of tributary streams.

## Unlike Pacific salmon, bull trout

- Live longer—13 or more years
- Exhibit light-colored spots on a dark body
- Prey primarily on other fish species
- May spawn multiple times throughout their life history
- Exhibit nonmigratory and migratory life history forms
- Are more elusive and secretive (juveniles are observed mostly at night)
- Require the cleanest and coldest water of any salmonid in North America

From July 2002 to June 2003, a total of 82 adult bull trout, ranging from 16 to 28 inches long (40 to 70 cm), were captured at various locations in the Hoh River, South Fork Hoh River, and Kalaloch Creek; outfitted with radio transmitters; and safely released. Transmitters, each with a unique code allowing individual fish to be identified by their signal, were inserted into the body cavity through a small incision. Movements were tracked using five fixed stations strategically located and evenly distributed throughout the watershed. Each station includes two directional antennas, a receiver, and amplifiers that detect

upstream or downstream movements of individual fish. In addition, fish were tracked weekly by boat or from the riverbank and biweekly from the air, covering 62 miles (100 km) of the Hoh River and its tributaries, 155 miles (250 km) of the Pacific Coast, and the lower portions of numerous coastal rivers and creeks.

Bull trout implanted in the Hoh River exhibited complex seasonal movements. In the first year of the study, three general patterns of movement emerged: (1) upstream migration during the presumed spawning period from September to November; (2) downstream movement into the lower river followed by prolonged periods of residence;



Federally listed as a threatened species, bull trout in the Hoh River Basin of Olympic National Park have been shown to migrate in complex patterns that include moving from freshwater to marine environments. These preliminary research findings suggest potential vulnerability to recreational and gill-net fisheries that target salmon and steelhead.

and (3) emigration by 51% of implanted fish downstream into the estuary, the Pacific Ocean, and for some fish, into the lower reaches of other coastal rivers and streams outside the Hoh Basin.

Radiotelemetry has proven to be an effective method to determine movements of adult bull trout in logistically difficult terrain. This investigation provides the first information on bull trout migrations in a largely unaltered coastal river and the first verification of diadromy for the species. Initial data on seasonal movements and habitat use identify potential vulnerability to recreational and gill-net fisheries that target salmon and steelhead throughout the year. Bull trout may be susceptible to incidental harvest based on the following life history attributes: (1) extensive movement to and from saltwater and entry into multiple rivers where fisheries exist; (2) timing of outmigration from December to March and entry into the river that coincides with salmon and steelhead harvest seasons; and (3) longevity and capacity for repeat spawning, which increase the number of possible encounters with fisheries. The effects of fishing mortality at the population level remain unknown. The final report for this study will provide in-depth analysis of migratory patterns, habitat use, spawn timing and location, and effects of harvest, leading to the establishment of appropriate conservation and recovery strategies for this species. ■

[sam\\_brenkman@nps.gov](mailto:sam_brenkman@nps.gov)

Fisheries Biologist, Olympic National Park; Port Angeles, Washington

[steve\\_corbett@nps.gov](mailto:steve_corbett@nps.gov)

Fisheries Biologist, Olympic National Park; Port Angeles, Washington